

REMARKS

Reconsideration of the present application is respectfully requested.

Claims 1-28 previously presented for examination remain in the application. No claims have been amended, canceled or added.

The drawings stand objected under 37 C.F.R. § 1.83(a) to as being considered not to show the feature of "a plurality of leakage ring oscillators" as set forth in claim 20. Applicants respectfully submit that "a plurality of leakage ring oscillators" is shown in the Figures as filed and thus, no corrections are required. Specifically, attention is directed to Figure 9 and accompanying text of the Specification at paragraphs [0070] – [0072], for example, which clearly show and describe a plurality of leakage ring oscillators as set forth in claim 20.

Paragraph [0070] states, for example,

Figure 9 is a high-level block diagram of a host integrated circuit chip 900 that includes a plurality of ring oscillators 905, only a few of which are identified with reference numbers, disposed at various locations around the chip. For the embodiment shown in Figure 9, one or more of the ring oscillators 905 are leakage ring oscillators according to one or more embodiments described herein.

(Specification, Paragraph [0070])(Emphasis added).

Based on the foregoing, applicants respectfully request withdrawal of the objection.

Claims 1-7 stand rejected under 35 U.S.C. § 102(b) as being considered to be anticipated by U.S. Patent No. 5,410,278 to Itoh et al. ("Itoh").

Claim 1 includes the limitations

an n-type and a p-type device coupled between first and second supply voltages at a terminal; and

an output node coupled to the terminal, the output node, during operation of the apparatus, to provide an output signal having a switching delay in only one direction that is directly proportional to the leakage current of one of the n-type and p-type devices.

(Claim 1)(Emphasis added).

Applicants respectfully submit that Itoh fails to teach at least the claimed apparatus as set forth in claim 1 to provide an inverted output signal having a transition delay in only one direction that is proportional to a leakage current of a device of the apparatus.

Itoh discloses a ring oscillator that includes a plurality of inverters (11a, 11b and 11c in Figure 1), a leakage current generating part (12), and a current controlling part (13). The current controlling part supplies the inverters with a source current in accordance with a value of a leakage current generated from the leakage current generating part. The leakage current generated from the leakage current generating part is correlated with a leakage current generated from a memory cell. (Itoh, Abstract).

Figure 3a of Itoh shows the inverter circuits of Itoh in more detail and Figure 3b shows the relationship between the input voltage "A" and the output voltage B of the inverter 11a. There is no disclosure in Itoh to teach or suggest that a transition in only one direction at an output node is correlated with a leakage current of a device in the apparatus of Itoh.

For at least this reason, claim 1 is patentably distinguished over Itoh. Independent claims 7, 20 and 26 include a similar limitation. Claims 2-5, claims

8-12, claims 21-25 and claims 27-28 depend from and further limit claims 1, 7, 13, 20 and 26, respectively and thus, are also patentably distinguished over Itoh.

Claims 8-11 and 12 stand rejected under 35 U.S.C. § 103(a) as being considered to be unpatentable over Itoh in view of U.S. Patent No. 6,657,504 to Deal et al. ("Deal").

Claims 8-12 depend from and further limit claim 7, which includes a similar limitation as claim 1 argued above. Thus, for at least the reasons argued above in reference to claim 1, Itoh does not teach or suggest the claimed features of applicants' invention including at least the claimed apparatus that provides a transition in only one direction that is proportional to a leakage current of one of a p and an n type device in the apparatus.

It is stated in the Office Action that a combination of Itoh and Deal teaches the claimed features of applicants' invention as set forth in claims 8-12.

Applicants respectfully submit that such a combination would not be made.

In particular, Itoh determines the oscillating frequency of a ring oscillator based on a leakage current of a leakage generating part (as argued above) while Deal determines the oscillating frequency of a ring oscillator based on a ring clock count value and a system clock count value (Deal, Abstract). Thus, one of ordinary skill in the art would not have been motivated to combine Itoh and Deal.

Further, even if Deal and Itoh were to be combined, the combination would still fail to teach or suggest the claimed features of applicants' invention including at least the claimed apparatus to provide an output signal having a

transition delay in one direction that is proportional to a leakage current of one of a p or n type device of the apparatus.

As discussed, Deal discloses a system and method of determining ring oscillator speed wherein the oscillation frequency of a ring oscillator according to Deal is determined based on the ring clock count value and the system clock count value.

There is no teaching or suggestion in Deal of the claimed apparatus that provides an output signal having a transition delay that is related to leakage, much less a transition delay in only one direction that is proportional to a leakage current of one of a p or n type device in the apparatus. Thus, the combination of Itoh and Deal would also fail to teach or suggest the claimed feature of applicants' invention.

For at least this reason, claims 8-12, which depend from and further limit claim 7, are patentably distinguished over Itoh and Deal, alone or in combination.

Claims 13-19 and 26-28 stand rejected under 35 U.S.C. § 103(a) as being considered to be unpatentable over Deal in view of Itoh.

Claim 13 includes the limitations

an enable input to receive an enable signal; and
a leakage ring oscillator to be enabled in response to the enable signal being asserted, the leakage ring oscillator including
at least a first leakage inverter including a leaky device, the leaky device to be substantially fully turned on in response to the enable signal being deasserted; and
an output to provide an oscillating output signal in response to the leakage ring oscillator being enabled, a frequency of the oscillating output signal being dependent upon a leakage current of the first leakage inverter while the leakage ring oscillator is enabled.

(Claim 13)(emphasis added).

Neither Deal nor Itoh, alone or in combination, teach or suggest the claimed features of applicants' invention including at least the claimed leakage ring oscillator including at least a first leakage inverter including a leaky device that is to be substantially fully turned on in response to an enable signal.

As discussed above, one of ordinary skill in the art would not have been motivated to combine Deal and Itoh for the reasons discussed above.

If such a combination were to be made, however, the combination would still fail to teach or suggest the claimed features of applicants' invention as set forth in claim 13. More specifically, Deal discloses a ring oscillator having frequency that is dependent upon a ring clock count value.

Deal does not teach or suggest, however, use of a leakage inverter or any other feature associated with leakage. For at least this reason, applicants respectfully submit that the ring oscillator of Deal cannot be considered to be a leakage ring oscillator. Further, it is admitted in the Office Action at paragraph 6 that Deal is "silent about the at least a first leakage inverter including a leaky device, the leaky device to be substantially fully turned on in response to the enable signal being deasserted."

The combination of Itoh with Deal does not remedy these deficiencies. While the frequency of the ring oscillator of Itoh varies with the leakage of a discrete leakage current generating part (see e.g. leakage generating part 12 in Figure 1), the leakage current generating part cannot be considered to be a leakage inverter as set forth in the claims. As described in the Specification, a leakage inverter is an inverter that has a switching delay that is affected by a

leakage current associated with the inverter itself. In contrast, the leakage generating part of Itoh is instead, it is a diffusion region that has a leakage current that corresponds with a memory cell (see e.g. Itoh, col. 2, line 60 – col. 3, line 1). The diffusion region is not part of any of the inverters of Itoh.

For at least these reasons, a combination of Deal and Itoh would fail to teach or suggest the claimed features of applicants' invention as set forth in claim 13. Independent claim 26 also sets forth a leakage inverter and includes one or more limitations discussed in reference to one or more of claims 1 and 13. Claims 14-19 and claims 27-28 depend from and further limit claims 13 and 26, respectively. Thus, claims 13-19 and 26-28 should be found to be patentably distinguished over Deal and Itoh, alone or in combination.

Applicants gratefully acknowledge the allowance of claims 20-25.


Applicants respectfully submit that the applicable objections and rejections have been overcome and that claims 1-28 are in condition for allowance, and such action is earnestly solicited. If the Examiner disagrees or believes that further discussion will expedite prosecution of this case, the examiner is invited to telephone applicants' representative Cynthia Thomas Faatz at (408) 765-2057.

If there are any charges, please charge Deposit Account No. 02-2666.

Respectfully submitted,

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